

3 Riparian Management Commitments

The Commitments

- Rp1: State Riparian Rules as a Basis
- Rp2: High Sensitivity Channel Migration Zones (CMZs) (Tier 1)
- Rp3: Moderate Sensitivity CMZs (Tier 1)
- Rp4: High and Moderate Sensitivity CMZs on Tier 2 Lands
- Rp5: High Sensitivity Streams without CMZs (Tier 1)
- Rp6: Other Perennial Fish-Bearing Streams
- Rp7: Headwater Streams that are Both Perennial and Connected
- Rp8: Interface Caution Areas (ICAs)
- Rp9: Riparian Harvest Deferrals

A riparian area is the land immediately adjacent to a stream and extends away from the stream for a variable distance. Here, soil and vegetative conditions are characteristic of and influenced by proximity to water. Forests in riparian areas provide for the needs of fish by protecting water temperature (Cold), by creating pools and other habitat (Complex), and by filtering or trapping sediment (Clean). Riparian forests also contribute nutrients to aquatic systems from surface sources (litter fall) and in some cases from subsurface sources (groundwater flow). Temperature needs are met in large

part by the streamside forest canopy that provides shade and helps to moderate temperatures in the streamside area by sheltering it from environmental extremes. Habitat complexity and other functions are provided when trees die and fall into the stream, creating pools, sorting bedload, and providing cover for fish. Also, the roots of trees near the stream provide fish habitat and bank stability and the crowns of those trees generate litter fall that serves as nutrients for fish. Sediment from upland forests is filtered by the unbroken forest floor and trapped by vegetative debris. Because forestry can impact the ability of streamside forests to provide for these needs, riparian timber harvest must be performed carefully to preserve these important processes and functions.

Recognizing the need for careful streamside management, the three states in the Project Area have all passed laws that regulate management in these areas. There is no one prescription for streamside forests that is 100 percent scientifically correct. However, science informs managers who then try to translate the information into reasonable practice. Often this means drawing lines in an ecosystem that may not be so explicitly defined by nature. In *Creating a Forestry for the 21st Century* (Gregory 1997), Dr. Stan Gregory of Oregon State University explains it this way:

Riparian areas are broad interfaces with no discrete boundaries. The term “riparian management zone,” however, represents distinct spatial boundaries that are designated to achieve specific management goals.

The goal of the NFHCP Riparian Management Commitments is to supplement existing state riparian management regulations in meaningful ways. These commitments will reduce the risk to fish by further minimizing impacts to three of the Four C’s and therefore provide an important conservation benefit. Commitments are identified in five categories:

- A. State Riparian Regulations as a Basis
- B. Channel Migration Zones
- C. Other Streams that Support Fish

D. Headwater Streams

E. Riparian-Upland Interface

This Riparian Management section primarily addresses how Plum Creek will minimize impacts from timber harvest in riparian areas, but the commitments must be evaluated and viewed in the context of a larger riparian management picture. This picture includes all forest management-related activities, past and present. Gregory (1997) captures this well:

While recent changes in riparian management represent important advances, the landscape reflects more than a century of harvesting on all forest lands with little or no protection of riparian resources and aquatic ecosystems.

The Bull Trout Final Rule (Federal Register [FR] 1998a), which lists bull trout under the ESA as “threatened,” states:

Although state rules and regulations governing forested land management activities are improving, they are generally not adequate to conserve and recover bull trout or remedy the effects of past damage to bull trout habitats.... Perhaps the greatest threat to bull trout involving forest practices and roads stems from the ongoing and latent effects caused by over a century of logging.

This NFHCP will balance the minimization of current impacts on fish from harvest activities with the mitigation of impacts from past harvest practices. In other words, the NFHCP will do what regulations have not done well to date: it will address both lingering and “latent effects caused by over a century of logging,” as well as impacts from current practices.

Riparian Conservation is More Than the Buffers

Traditional riparian regulation has centered its attention on minimizing forestry impacts to riparian function through streamside buffering while ignoring opportunities to improve riparian recovery elsewhere. The NFHCP recognizes that a comprehensive strategy will seek to do both. While the harvest prescriptions in this chapter focus on minimizing the impacts related to riparian harvest, it is important to view these harvest prescriptions in the context of the package of other NFHCP measures that also focus on riparian function recovery. Examples include the following conservation commitments, which will be detailed in later sections of this chapter:

- **R5, R6, and R7:** Upgrade of old roads, hot spot treatment and surplus road abandonment efforts on Plum Creek’s extensive road system will manage sediment reduction at its primary source rather than relying wholly on streamside zones as a sediment filter. Also, the area occupied by roads within riparian areas will be reduced.
- **G1 and G2:** Range management commitments, combined with judicious use of fenced exclosures, will not only minimize current grazing impacts but allow recovery of fish habitat in impacted streams. These commitments will result in a positive trend in riparian function restoration to 1,928 miles of stream, which is 38 percent of Project Area stream miles.

- **Lg1 through Lg3:** Riparian vegetation restoration in impacted areas along 124 miles of Key Migratory Rivers will accelerate fish habitat recovery in these larger valley bottoms, which have had a greater diversity of legacy impacts from past management activities.
- **Existing state riparian regulations** currently preclude harvest along an estimated 65 percent (3,300 miles) of Project Area streams. Many of the streamside forest stands of these stream miles were harvested before riparian harvest regulations; their canopy cover, woody debris recruitment potential, and other riparian functions will improve throughout the life of the plan because of natural riparian stand development.
- **Neighboring federal landowners** own 59 percent of the land in the Planning Area compared to Plum Creek's 10 percent, and they own 72 percent of land in the Planning Area's Tier 1 watersheds compared to Plum Creek's 13 percent. Many of these federal acres are in wilderness areas, national parks, or are designated as unsuitable for timber management and will experience no riparian harvest. Those acres that are included in the suitable timber base have very conservative riparian management strategies consistent with the federal ESA goal of managing to promote recovery. Plum Creek's package of conservation commitments will enhance these efforts.
- **L4, Land Use Conservation Areas (LUCAs)** will require continued important streamside protection if Plum Creek sells its land. With a LUCA, conservation commitments similar to those for forest uses will be applied even if the new owner uses the land for something else. When the impacts of riparian harvest are evaluated, as they are in Chapter 4 of the EIS, they should be viewed in a variety of perspectives. What is the impact of riparian harvest itself on the various elements of habitat function? What are those impacts in the context of the other NFHCP commitments and natural forest ecosystem dynamics? And what are the impacts when viewed at a watershed or landscape scale? For example, the impact of riparian harvest must first be evaluated on 100 percent of the stream reach being harvested. Then, the 100 percent drops to 35 percent when you consider that state regulations preclude riparian harvest along 65 percent of streams in the Project Area, as previously mentioned. And when you consider neighboring ownership and the likelihood of harvesting stands adjacent to riparian areas, the riparian harvest would occur on less than 3 percent of the streamside miles in the first decade in Tier 1 watersheds, for example.

Forest Health and Tree Density Considerations

Throughout the Interior Columbia River Basin, forest landscapes have changed significantly in the last 100 years (Quigley and Arbelbide 1997). Old multi-layered and single-layered forests have declined as have early seral forests. During the same period, exotic plant species and dense forests of smaller diameter and more shade tolerant trees have increased leading to a higher susceptibility to large-scale forest health problems such as disease and severe insect outbreaks. Forest fires have become less frequent, but more severe. Many of these changes are attributable to a century of fire suppression in ecosystems where more frequent low-intensity fire is a dominant influence.

In the absence of fire, net biomass accumulates in interior forests because the rate of biomass loss through rotting alone is much less than biomass inputs through forest growth. Accumulation of biomass in many forests is thought to result in woody debris levels that are much higher than those that may have been common prior to fire suppression. In addition, as seral fire resistant trees decline, they are replaced by dense stands of smaller shade tolerant trees. Because of their shade tolerance, self-thinning that can result from the “shading out” of less shade tolerant trees is substantially reduced and, instead of dying, the trees become more and more crowded, growing more slowly and losing vigor and resistance to disease and insects. Also, when woody debris accumulates on the forest floor and the live crowns of shade tolerant trees remain low to the ground, a “ladder” is provided for ground fires to climb to tree crowns. This results in very intense fires that can seriously damage the environment.

For these reasons, a simple no-harvest strategy for riparian forests east of the Cascades, while considered to be a low or minimal risk approach, may actually increase risks to riparian function in certain cases. The NFHCP riparian harvest strategy seeks to balance the types of risk while providing limited forestry opportunity in some places.

Stream Temperature

Cold water is thought to be an important life history requisite for native fish, and bull trout in particular. Preliminary laboratory work being conducted at Montana State University supports this contention, indicating the optimal temperature range for bull trout growth and fitness is generally colder than for other salmonids.

Maximum water temperatures are most influenced by the amount of direct beam solar radiation striking the stream surface (Brown 1969). It is also known that canopy cover over streams reduces direct beam solar radiation input, thereby keeping streams cooler in the summer. Canopy cover also reduces radiational cooling, keeping water warmer in winter. While timber harvesting has been shown to greatly alter canopy cover over streams when little or no streamside buffer has been retained (see review by Beschta et al. 1987), no studies specific to streams in the Planning Area have examined the effect of leaving contemporary streamside buffers.

Because no studies specific to the Planning Area were available, Plum Creek conducted two studies to examine the influence of streamside harvest per existing regulations along perennial streams in Montana and Idaho. The first one was summarized in Technical Report #12 (Plum Creek 1998e). Canopy cover and riparian stand conditions for nine perennial streams in western Montana and one perennial stream in northern Idaho were examined before and after timber harvest in 1997. Canopy cover reductions following harvest ranged from zero to 13 percentage points. Mean canopy cover before harvest was 67 percent, while mean canopy cover after harvest averaged 62 percent. Of the 10 sites measured, four had statistically significant decreases in canopy cover (Figure NFHCP3-1).

Mean Canopy Cover Before and After Harvest for 9 Sites in Montana and 1 Site in Idaho (Site 4). Sites 3, 5, 6, and 7 Had a Statistically Significant Decrease in Canopy Cover.

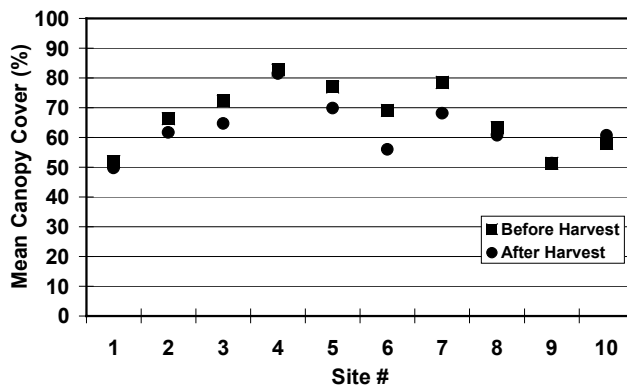


Figure NFHCP3-1

Montana maintain more than 92 percent of pre-harvest canopy cover and are similar to results from a recent study of Oregon’s forest practice regulations (Zwieniecki and Newton 1999). Because virtually all canopy cover is retained, substantive changes in temperature patterns are not expected under existing regulations for larger perennial streams. Because the NFHCP riparian commitments require additional tree retention for maintenance of other riparian functions (such as large woody debris recruitment and channel migration), canopy cover changes will be even less.

Washington and Idaho do not have as rigorous of retention requirements under the state rules for smaller perennial streams as Montana does. Plum Creek desires to reduce risk further on these smaller streams by retaining more canopy cover. Therefore, NFHCP prescription Rp7, *Headwater Streams*, was designed to provide additional conservation for these streams.

Although canopy cover should be maintained at very close to pre-harvest levels and canopy cover has been shown to be a dominant factor influencing water temperature, uncertainty exists about how this exactly translates to stream temperature maintenance. No studies have been undertaken in the Planning Area to examine actual changes in water temperature resulting from harvesting under existing regulations (and none under the enhanced protection proposed). As such, Plum Creek will undertake an extensive study of water temperature changes following riparian harvesting as part of the Adaptive Management requirements of the NFHCP (see AM1, *NFHCP Effectiveness Monitoring and Core Adaptive Management Projects*, in Section 8, and Core Adaptive Management Project No. 3 in Appendix AM-1). Where biologically relevant changes in stream temperature are discovered, prescriptions will be modified.

Plum Creek Technical Reports and the Development of Commitments

In developing riparian commitments that make important conservation contributions, Plum Creek was interested in identifying opportunities where those contributions have the greatest

The second study was conducted in 1998 on Class 1 (perennial fish-bearing) streams in Idaho (Plum Creek Timber Company data). This study only examined canopy cover following harvest. Potential changes were evaluated by identifying an adjacent “reference” reach immediately upstream or downstream of the treated reach where the riparian area had not been harvested. This study found no significant difference in stream canopy cover between harvested and reference reaches.

These two studies found that existing regulations in Idaho and

certainty of providing additional conservation benefit to fish. Plum Creek scientists examined riparian systems in order to guide managers in determining where the company's conservation resources could be most effectively focused. This is particularly important for the task of optimizing contributions within a conservation package approach. Among the NFHCP technical reports, the following were the most directly useful in developing riparian prescriptions.

NFHCP Technical Report #7, *Design of effective riparian management strategies for stream resource protection in Montana, Idaho, and Washington* (Plum Creek 1999b), describes methods to describe and classify stream segments by their sensitivity to management impacts. These sensitivities are based upon a combination of the significance of wood in creating a variety of habitat functions in different channel types, the abundance of fish in these channel types, and where fish are likely to spend the most sensitive parts of their life cycle. Not all stream channels or the habitat they provide respond the same to timber harvest. This knowledge helps managers to focus commitments where they provide the greatest certainty of a conservation benefit for fish. Also, the report describes the amount and characteristics of riparian stands in the Project Area and quantifies the relationships between those stands and their contributions to various essential habitat functions. This enables the development of riparian harvest strategies with a high level of conservation effectiveness, where the maximum amount of conservation benefit may be obtained for a given amount of conservation cost.

NFHCP Technical Report #12, *Stream temperature considerations in the development of Plum Creek's Native Fish Habitat Conservation Plan* (Plum Creek 1998e), discusses the temperature needs of fish in the Planning Area. It also describes the relationships between stream temperature, canopy closure, and altitude based upon data collected from streams on Project Area lands. Results are presented from a study conducted on Plum Creek lands in the Project Area that compared pre-harvest canopy closure with post-harvest canopy closure for riparian harvests conducted according to State rules. Also included is a discussion of the potential influence of small headwater streams on temperatures in streams that support fish downstream.

NFHCP Technical Report #8, *Synthesis of watershed analysis and ecoclassification at a river basin scale for the conservation and management of aquatic ecosystems* (Plum Creek 1998c) looks more carefully at landform variables that may be related to both fish distribution and sensitivity to forestry. Stream channels can be described meaningfully in "geomorphic guilds" with varying management implications that enhance ability and confidence in managing riparian areas. This report supports the work of the Riparian Report and provides a solid framework for adaptive management.

An important goal of the NFHCP is conservation effectiveness. It is in the interests of both native fish habitat and Plum Creek to allocate finite resources toward efforts with the highest conservation benefits. The technical work helps Plum Creek provide the Services with confidence that conservation measures will be effective. And, just as importantly, it helps managers evaluate risks, costs and benefits so that resources may be allocated to construct a conservation package with a high level of effectiveness.

A. State Riparian Regulations as Basis

As mentioned, state regulations governing activities in streamside areas have been developed in Washington, Idaho, and Montana to address the needs of fish and water quality, and require careful management. In Montana, the rules governing Streamside Management Zones (SMZs) have only been in place since 1993. In Washington and Idaho, riparian regulations were developed as a part of Forest Practices Acts in 1974 and 1976, respectively. In Washington, the rules have been significantly revised, most recently in 1992, and are currently undergoing a major review and have been supplemented with emergency regulations in January of 2000. These emergency rules are based upon the *Forests and Fish Report* (FFR) and are intended for eventual adoption as permanent rules. Similarly, Idaho's streamside rules were significantly revised in 1995. These regulations, which will be collectively referred to as **SMZ rules**, represent important contributions to riparian conservation.

Rp1: State Riparian Rules as a Basis

Plum Creek will use State Riparian Rules as a minimum in all cases for applying NFHCP riparian prescriptions. The remainder of the prescriptions provide supplemental conservation to the state rules in described situations where additional conservation benefit can be derived. These supplements will add rigor within the state rules as well as extending protection beyond them.

- **In Montana**, The Montana SMZ Rules dated 3/15/93 will be used as the NFHCP basis. See Appendix Rp-1.
- **In Idaho**, The Idaho Forest Practice Rules, as revised 7/1/98, will be used as the NFHCP basis. See Appendix Rp-1.
- **In Washington**, the current state rules are undergoing change and have been supplemented with emergency rules in January of 2000 based upon FFR. The emergency rules (and eventually the permanent rules) provide for the use of prescriptions in an approved HCP in lieu of certain provisions of the state rules. Since the NFHCP riparian rules will be used in lieu of the Washington riparian rules (rather than as a supplement to them, as in Idaho and Montana), a rule set (Appendix Rp-2) has been described for the NFHCP to provide the rules basis. Appendix Rp6 summarizes which of the Washington rules are replaced by NFHCP prescriptions and which are not.

Rationale:

Because of large investments in training and field monitoring, Plum Creek foresters and loggers have become very proficient at implementing state riparian rules, along with other BMPs. In a letter of commendation from the Flathead Basin Commission in 1995, Chairman Larry Wilson states:

Plum Creek's management practices have improved each year since the annual audits were initiated, and scores reflect a higher rate of compliance than any other ownership category. The high BMP scores signify the success your firm has had in applying its

Environmental Forestry techniques to lands managed in the Flathead Basin. ...The Commission commends you and your employees for what Plum Creek has achieved in its effort to protect water quality.

State regulations must be adhered to regardless of HCP commitments and therefore must continue to be well understood and implemented. For these reasons, the additional NFHCP Riparian Management Commitments are not developed as replacements to state rules (except as discussed in some situations in Washington state), but rather as supplements to existing rules. In other words, NFHCP implementation will first involve rigorous implementation of SMZ rules as a base level of conservation. The NFHCP commitments, then, have identified specific places or situations where important additional conservation can be provided to complement SMZ rules. These include measures that supplement the SMZ rules from within by a commitment to leave more trees in locations determined to provide the maximum benefit (Rp2 through Rp7). The SMZ rules are also supplemented outside of the Streamside Management Zones by providing for an additional caution area (Rp8).

Descriptions of the existing riparian rules in Montana and Idaho are shown in Appendix Rp-1. Because Washington has new emergency riparian rules (and will soon have new permanent rules) that allow for HCP prescriptions to be used as replacement rules, the use of the old rules with NFHCP supplements is not appropriate. Therefore, separate conservation measures for the NFHCP have been developed for Project Area lands in western and eastern Washington. The eastern Washington measures are supported by rationale used for the remainder of the Project Area while the measures applicable to western Washington were based largely upon recent Watershed Analysis work. Both sets of measures and the technical rationale supporting the western Washington measures are set forth in Appendix Rp-2.

The drawing (Figure NFHCP3-2) illustrates how the state rules function as a basis for the NFHCP riparian strategy and where the NFHCP commitments will supplement them and add additional protection. In this example, the state SMZ Rule is shown as a single width buffer. Three ways of supplementing the rules are shown in the example.

1. Rp2 supplements the SMZ rules by adding protection where there are high sensitivity Channel Migration Zones (CMZs) (see Rp2 on page 3-12).

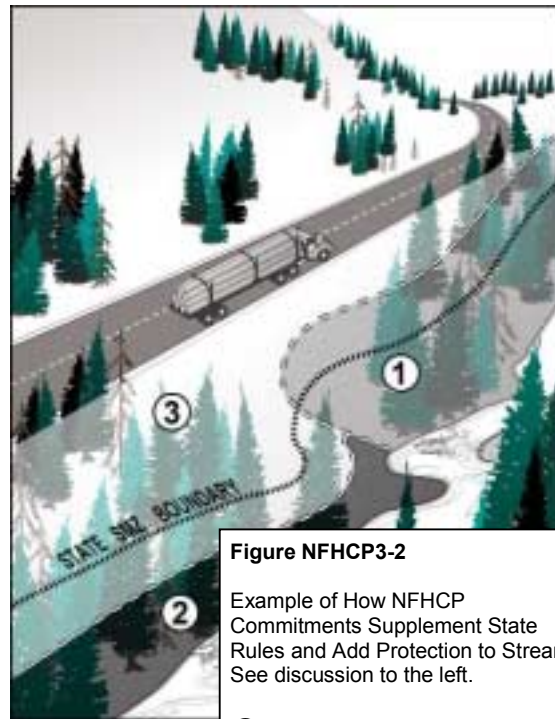


Figure NFHCP3-2

Example of How NFHCP Commitments Supplement State Rules and Add Protection to Streams. See discussion to the left.

- ① Supplemental CMZ protection (Rp2, page 3-12)
- ② No-harvest zone for high sensitivity reaches (Rp5, page 3-17)
- ③ Interface Caution Area (Rp8, page 3-22)

2. Rp5 is shown supplementing the SMZ rules where there is a high sensitivity stream with confined channels (see Rp5 on page 3-17)
3. Rp8 shows the caution area in the riparian-upland interface between the riparian area and the closest road (see Rp8 on page 3-22).

Appendix Rp-3 is located right after the summary of prescriptions for each state. It is intended to illustrate how the NFHCP commitments work to supplement the state riparian rules for each state.

A Note on Fish Presence and Absence

Washington, Idaho, and Montana differ in how they classify streams according to fish presence. It is helpful to consider the differences and how they apply to the NFHCP prescription.

In Washington, a technical determination of fish presence or absence is used to classify stream types, along with a variety of other physical criteria. This approach can be somewhat problematic in operational forestry because, first of all, it is difficult for a forester to make the fish presence/absence determination if it has not already been done by a fish biologist. Secondly, verifying absence is very difficult and can be inconclusive. However, Washington is classifying streams based upon an actual determination of fish presence through electro-shocking or predictive models.

Idaho and Montana have taken a less technical approach that does not rely on electro-shocking their streams, so fish presence must be estimated. In Idaho, the notion of fish presence or absence is addressed by classifying streams as either “important for spawning, rearing, or migration of fish” (Class I streams), or as “used by few, if any, fish for spawning or rearing” (Class II). Additionally, Idaho rules allow a forester to decide whether a stream is important for spawning, rearing, or migration based on the size of the upstream watershed. This is helpful for the forester who lacks technical fish presence information, as electro-shocking would provide. This classification system avoids the problems associated with trying to verify actual fish absence while still recognizing the different status or role of headwater streams.

In Montana, any stream that is determined to “support fish” is automatically a Class 1. The rules do not define what it means to “support” a fish. But the definition is not significant because the class also includes any other stream that flows more than six months per year and is connected to another downstream segment. The inclusive definition brings in many streams that are not perennial and may not support fish. Class 1 streams in Montana include many “headwater” streams. As in Idaho, there is no requirement to verify absence of fish as a factor in classifying a stream.

The NFHCP avoids requiring that a forester make a fish presence/absence determination. Instead, the forester will classify streams according to the approach used by the state classification system for that state. This needs to be done regardless because state SMZ rules are the starting point for implementing NFHCP supplemental prescriptions.

B. Channel Migration Zones

Plum Creek's Technical Report #7 (Plum Creek 1999a) has identified that **Channel Migration Zones (CMZs)** are perhaps the greatest opportunity to offer a significant conservation benefit by supplementing SMZ rules.

What is a Channel Migration Zone? Most valley floors in the Project Area were formed by depositions over the last 10,000 years, either from glaciers as they retreated or from rivers that have flooded and meandered and deposited sediment. Because of changes in climate and erosional patterns, rivers or streams often occupy an active flood plain that has been downcut within the larger valley floor. The abandoned floodplain is known as a terrace, while the active floodplain encompasses the CMZ, upon which a stream has a likelihood of moving around or migrating during a period of decades or forest management cycles.

To identify the CMZ, foresters will first determine the **flood prone width**. This is the flood plain that would be covered with water if the elevation of the water surface were two times **bankfull depth** (see Figure NFHCP3-3). Also see Appendix Rp-4, *Riparian Definitions and Procedures*.

terms

ordinary high water mark (ohwm): the location on a stream bank where the water level normally reaches during peak flow

bank full depth (bfd): the average depth of the stream when the flow is at the ordinary high water mark

bank full width (bfw): the average width of the stream when the flow is at the ordinary high water mark

flood prone width (fpw): the valley width occupied by water if the stream were two times bank full depth

terrace: the valley bottom which is elevated higher than the active flood plain.

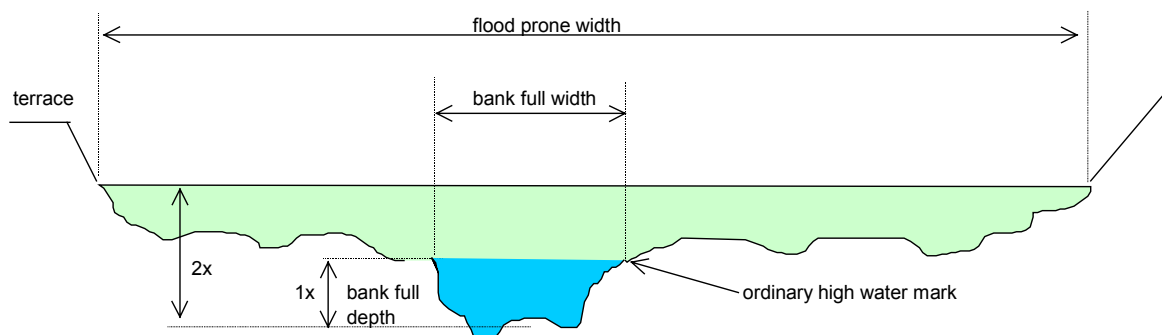


Figure NFHCP3-3
Channel Cross-Section Terms

Additional indicators for the CMZ include evidence of active or relic side channels, presence of vegetation associated with wetlands, or the presence of seeps and hydric soil features.

The CMZ has been identified as an area where special attention can provide a benefit to fish because:

- It provides greater fish habitat complexity than other habitats.
- It is particularly important for bull trout because they tend to seek out this specialized and limited habitat. CMZs often occur where steeper streams enter a broader and flatter valley. These areas generally exhibit groundwater upwelling (and possibly **hyporheic**, or underground, water exchange), which provides the very cold water bull trout seek for spawning (see NFHCP Technical Report #5, *Goat Creek and Piper Creek watershed analysis*, Plum Creek 1996a).
- Streams migrate or change locations within the CMZ and could potentially move outside of the streamside management zone provided by SMZ rules.

Dr. Matt O'Connor and Greg Watson have worked together to develop a classification system for CMZs. In their work, which is an appendix to Plum Creek 1999a, they have built upon existing classification systems designed for streams in general and applied specifically to CMZs (see summary of the CMZ classification system in Table NFHCP3-1). The purpose was to take a closer look at CMZs to give Plum Creek managers more specific information so conservation resources could be focused where they have the greatest certainty of benefiting fish.

O'Connor and Watson identified five classes of CMZs, A through E. On the "A" end of the spectrum, stream gradients are flat and channels migrate and meander slowly through bank erosion. On the "E" end, stream gradients are steeper, and channels migrate dramatically. The types in the middle of the continuum (B and C) are the most dependent upon large woody debris (LWD) in streams to provide for the needs of fish and are the locations that fish (bull trout in particular) are most likely to select for spawning. They are therefore considered **high sensitivity CMZs**. Fish habitats in B and C stream reaches benefit most greatly from a more restrictive prescription. In stream types on the ends of the continuum (A and D-E), retention of additional timber is also important, but habitat features are also provided by elements other than LWD. These are **moderate sensitivity CMZs**.

TABLE NFHCP3-1

Descriptions of Channel Migration Zone Types and Their Sensitivity to Timber Harvest

CMZ Type	Definition	Stream Gradient	Sensitivity to Timber Harvest
A	Flat, relatively unconfined floodplain. Channel changes primarily through gradual erosion at the outside of bends, but also through flood events.	0% to 1.5%	Moderate
B	Flat to moderately steep, unconfined to moderately confined floodplain. Channel changes primarily through LWD obstructions and/or bedload deposition during flood events, but also through gradual erosion at the outside of bends.	1% to 3.5%	High
C	Moderately steep, moderately confined floodplain. Channel changes through LWD obstructions and/or bedload deposition during flood events.	3% to 6%	High

TABLE NFHCP3-1

Descriptions of Channel Migration Zone Types and Their Sensitivity to Timber Harvest

CMZ Type	Definition	Stream Gradient	Sensitivity to Timber Harvest
D	Steep, alluvial fans. Channel changes primarily through bedload deposition during flood events, but also through LWD obstructions.	4% to 8%	Moderate
E	Steep, relatively confined floodplain. Channel changes primarily through bedload deposition during flood events, but also through LWD obstructions.	4% to 8%	Moderate

A CMZ key is designed to serve as a field guide to help foresters recognize different CMZ types and determine the proper prescriptions (see Appendix Rp-5). For the highest sensitivity CMZs, the prescriptions allow no timber harvest within the complete width of the CMZ, plus additional harvest constraints on the terrace slopes adjacent to the CMZs. For moderate sensitivity CMZs, the prescriptions impose greater harvest restrictions than are currently allowed in the CMZ. The prescriptions follow:

Rp2: High Sensitivity Channel Migration Zones (CMZs) (Tier 1)

Applies where:

- Stream segments with CMZs occur in Tier 1 watersheds, east of Cascades crest.
- CMZs are classed as Type B and Type C or are keyed out as high sensitivity using the CMZ field key.
- CMZs contain perennial streams that may support fish.

Prescription applied:

- **In the CMZ:**
 - No-harvest full width.
 - Yarding corridors are prohibited unless needed to minimize road construction. When needed they must be approved as a site specific cooperative management response and kept to the minimum width while still allowing harvest.
- **On the terrace slope** from the outside of the CMZ upslope for 50 feet:
 - Apply the limited harvest rule and provisions.
 - No-harvest will be applied where terrace slope is within 25 feet of the ordinary high water mark.
 - Exception: where stream segment is less than 10 feet, bank full width, and is further than 500 feet from its confluence with a larger stream, the no-harvest zone need not be extended to the terrace slope.
 - Terrace slope prescription need not extend beyond the top of the terrace slope (the edge of the bench) provided the state rule is met.
- Assure that the applicable state riparian rule is met.

Limited harvest rule:

Harvest is allowed to an average 22 foot spacing or less of trees larger than 8 inches diameter breast height (DBH), which corresponds to 88 trees per acre.

- No more than 50 percent of trees greater than 8 inches DBH may be harvested.
- Trees retained must be representative of the size of trees in the pre-harvest stand.

Limited harvest provisions:

- **Concentration:** Concentrate leave trees closer to the stream (or no-harvest CMZ, when applicable).
 - For implementation audits, concentration will be considered met if on average no more than 30 percent of the allowable number of harvest trees have been removed from the first 25 feet of streamside zone measured out from the stream (or no-harvest CMZ, where applicable).
- **Lineal distribution:** Trees retained will be lineally distributed evenly along the length of the stream segment even though they may be concentrated closer to the stream. When operationally necessary for yarding, openings in the lineal distribution of trees will be allowed provided:
 - Openings are as small as operationally feasible
 - Reduced retention in openings is compensated for adjacent to openings
- **Tree lean:** Trees leaning toward the stream or CMZ will be favored for retention.
- **Streamside road mitigation:**
 - Within harvest unit: Where a stream adjacent parallel road occurs within 50 feet of a stream or CMZ on the same side of the stream as the harvest unit, trees per acre for retention must be calculated for the entire 50 feet. In other words, retention in the forested portion of the limited harvest area must compensate for the lack of trees in the road.
 - Across from harvest unit: Where a stream adjacent parallel road occurs within 50 feet of a stream or CMZ across from the harvest unit, compensation for trees in the road will occur in the following manner. A determination will be made whether there are enough trees in the full 50 feet across the stream to meet retention requirements in the event of a future harvest there. If compensation can not be provided for across the stream, additional trees will be left in the current harvest to compensate for the portion of the road in the 50 foot zone across the stream.
 - Road abandonment: As an incentive to abandon streamside roads, road abandonment according to the specifications of appendix R-7 may be performed in lieu of increased retention.

Rationale:

Rp2 recognizes the importance of the high sensitivity CMZ with a no-harvest prescription as an important conservation benefit compared to a selective harvest that is currently allowed in SMZ rules. Specifically tailoring conservation to the high sensitivity CMZ rather than establishing SMZs at the edge of the existing stream bank as in the SMZ rules adds an important conservation benefit.

First of all, this highest protective level is keyed to these CMZ types in Tier 1 watersheds. Tier 1 watersheds are designated as such based upon bull trout presence and biology. Among the native salmonids in the Project Area, bull trout have the most specialized habitat preferences as well as the most rigorous habitat needs. The most sensitive stages of their life

cycle are spawning, incubation, and early rearing. These live history stages take place in very specialized locations characterized by hyporheic exchange and groundwater upwelling that tends to occur where high gradient stream channels empty onto a low gradient valley bottom. NFHCP Technical Report #8 (Plum Creek 1998c) shows how these reaches can be described and identified.

The no-harvest protection throughout the CMZ recognizes the sensitivities of these channels to management because of the importance of downed wood for fish habitat (Plum Creek 1999b). In these channels, pools, spawning gravel, hiding cover, and other habitat characteristics are most closely associated with the presence of woody debris in the streams. Without ongoing contribution of woody debris to these streams, the existing woody debris would eventually degrade or flush out of the system and the stream would be at risk of developing over time a more homogenous plane bed channel without pools. In the flatter gradients of a Type A CMZ, pool formation is often observed independently of the presence of wood. And in the steeper gradient Type E CMZs, rocks and boulders are much more common and contribute, along with woody debris, to the presence of important habitat features.

Also, the no-harvest protection throughout the high sensitivity CMZs recognizes that avulsion is the dominant channel migration process. When avulsion occurs, the stream channel is filled up with bedload or woody debris during a flood event and the stream can jump its banks and move to a dramatically different location in the CMZ. Because the stream can move unpredictably to any location in the CMZ, the additional protection for the full CMZ width reduces the risk that the stream will move outside of the area of maximum tree retention.

In addition, the terrace slope prescription is determined from the outer edge of the CMZ rather than from the ordinary high water mark as in the SMZ rules. This widens the overall riparian management area to conform to the extra width of the CMZ and provides additional

Eighty-Eight Trees and the Limited Harvest Rule

Where did 88 trees per acre come from, anyway? The limited harvest rule specifies the retention of 88 trees per acre, a number that will be cropping up in other riparian prescriptions as well. This number is derived from the Montana SMZ rule, which specifies that 10 trees be retained in 100 lineal feet of SMZ 50 feet wide, which is approximately 88 trees per acre. A per-acre approach works well for variable width limited harvest zones. When 88 trees per acre is used as a minimum retention level, Plum Creek calculates that 105 trees per acre are retained on average.

It is important to understand that for trees that are large enough, 88 trees per acre is a fully stocked stand of timber. When small trees occupy a site at a very dense stocking, they can stagnate and nearly stop growing without dying (see discussion of "Forest Health and Tree Densities"). "Relative density" is a forestry measure that indicates the level of stocking on a site in relation to tree size. Using this measure, a stand of 16-inch-diameter trees at 100 trees per acre occupies the site to the same degree as a stand of 9-inch-diameter trees at 250 trees per acre. The time span required to develop riparian stands with large trees in the absence of fire or harvest can be very long.

Even after a stand has been harvested to 88 trees per acre, its density is high enough that regeneration is generally unable to become established in the shade of the residual trees because the site is fully occupied. Without regeneration, Plum Creek would not be able to easily grow replacement trees. Therefore, most of the 88 trees per acre would likely eventually mature and fall over—perhaps into the stream where they can directly contribute to improved fish habitat. Though the limited harvest rule is represented as a management opportunity, adaptive management may reveal that it actually advances riparian development in terms of recruiting quality large woody debris and is a conservation opportunity as well.

riparian protection on the terrace slope in those cases where the stream is sufficiently close to the edge of the CMZ that a 25-foot no-harvest minimum would extend up the terrace slope. This does not apply to smaller streams that occur within a CMZ because those streams are contained within a relatively small CMZ (almost always encompassed within the minimum buffer required by state law) and exhibit much less hydraulic power than larger streams. Therefore, even relatively small pieces of woody debris will function in smaller streams. For instance, smaller woody debris that would be transported by larger streams can become lodged and create pools in small streams.

Rp3: Moderate Sensitivity CMZs (Tier 1)

Applies where:

Stream segments with CMZs in Tier 1 watersheds, east of the Cascades crest.

- CMZs are classed as Type A, D, or E, or are keyed out as moderate sensitivity using the CMZ field key.
- CMZs contain perennial streams that may support fish.

Prescription applied:

- **In the CMZ:**
 - No-harvest for 25 feet from the ordinary high water mark.
 - Yarding corridors are prohibited through no harvest areas unless needed to minimize road construction. When needed, they must be approved as a site specific cooperative management response and kept to the minimum width while still allowing harvest.
 - Apply limited harvest rule and provisions for remainder of CMZ (see Rp2).
 - Favor trees adjacent to relic channels for retention.
 - Apply equipment exclusion rule (see below).
- **On the terrace slope** from the outside of the CMZ upslope for 50 feet
 - Apply the limited harvest rule and provisions (see Rp2).
 - No-harvest will be applied where terrace slope is within 25 feet of the ordinary high water mark.
 - Exception: where stream segment is less than 10 feet, bank full width, and is further than 500 feet from its confluence with a larger stream the no-harvest zone need not be extended to the terrace slope.
 - Terrace slope prescription need not extend beyond the top of the terrace slope (the edge of the bench) provided the state rule is met.
- Assure that the applicable state riparian rule is met.

CMZ equipment exclusion rule:

Tracked or wheeled equipment operation in the CMZ will be prohibited (except for road construction), except where all of the following specific conditions are met:

- There exist winter conditions with adequate snow or frozen ground or very dry conditions in the absence of riparian vegetation types, **and**
- Operation of wheeled or tracked equipment does not cause rutting or displacement of the soil, **and**
- The vegetative integrity of the CMZ is conserved, **and**
- Operation of wheeled or tracked equipment is conducted no closer than 50 feet from the ordinary high water mark of an active channel in Montana or eastern Washington, or 75 feet in Idaho.

Rationale:

Compared to state rules, the Rp3 prescription generally increases the area along streams where timber harvest is excluded. In fact, because the Type E CMZs are generally smaller streams at a higher gradient, the CMZ width is often less than 50 feet, making the entire CMZ a no-harvest area in a majority of instances.

In Type A CMZs, the dominant migration process is through bank erosion rather than avulsion. This means that the channel generally migrates more predictably and slowly in the same direction and at rates of only several inches per year. The risk of channel jumping to a dramatically different portion of the CMZ is much less than in a high sensitivity CMZ. If a channel were to migrate at the rate of six inches per year all in the same direction, at the end of the permit period the channel would still be flowing within the no-harvest zone.

The limited harvest rule also provides for timber retention (discussed under rationale for Rp2 and Rp4), and it extends onto the terrace slope measured from the outside of the CMZ. This widens the total riparian management area as the CMZ becomes wider, just as in Rp2. In the unlikely event that a stream channel in a Type A CMZ does jump from the no-harvest zone to the limited harvest zone, LWD recruitment will be sufficient to maintain the quality and quantity of fish habitat in the pool-riffle channel class.

Rp4: High and Moderate Sensitivity CMZs on Tier 2 Lands**Applies where:**

- Stream segments occur with CMZs in Tier 2 lands, east of the Cascades crest.
- CMZs are classed as any type.
- CMZs contain perennial streams that may support fish.

Prescription applied:

- **In the CMZ:**
 - Apply the limited harvest rule and provisions (see Rp2)
 - Favor trees adjacent to active and inactive channels for retention
 - Apply the CMZ equipment exclusion rule
- **On the terrace slope** from the outside of the CMZ upslope for 50 feet:
 - Apply the limited harvest rule and provisions (see Rp2).
 - Terrace slope prescription need not extend beyond the top of the terrace slope (the edge of the bench) provided the state rule is met.
- **Assure that the applicable state riparian rule is met.**

Rationale:

It is also important to minimize the impacts to riparian function of timber harvest in Tier 2 CMZs. These provide habitat for native salmonids other than bull trout, many of which are habitat generalists and use a wider range of habitat conditions for various life stages.

Whereas state SMZ rules offer no specific protection for CMZs and terrace slopes, Rp4 provides clear guidelines for limited harvest and tree retention in these areas that influence aquatic habitat. The application of the limited harvest rule for the full CMZ provides for retention of more than enough trees to address fish habitat needs while allowing managers an opportunity to improve forest health and capture limited economic returns.

As discussed earlier, extensive no-harvest strategies embrace the lowest risk approach to minimizing impacts to aquatic habitat, provided forest health or significant fire events can be avoided. It is a short-term low risk approach, but in the longer run assumes some greater risk of a large magnitude because of potential unpredictable large-scale disturbances. Conversely, the limited harvest approach for Tier 2 CMZs allows management for greater ecosystem health and reduces the risk of large-scale problems in the long-term. The combination of these two approaches results in a balanced risk strategy that seeks to minimize both long- and short-term impacts of riparian management and fire suppression.

C. Other Streams that Support Fish

The remaining fish-bearing streams are those that have a very small chance of migrating to substantially different locations because they are typically confined to their locations by valley walls or high banks. Because these are not addressed in the CMZ prescriptions, additional conservation can be provided in this category.

Rp5: High Sensitivity Streams without CMZs (Tier 1)

Applies where:

- Stream segment occurs within Tier 1 watershed, east of the Cascades crest.
- Stream segment is perennial and may support fish.
- Stream segment is considered to be “high sensitivity” where it exhibits a **forced pool riffle/plane bed** morphology. See *Riparian Definitions and Procedures* (Appendix Rp-4).
- The upstream extent of the stream segment will extend at least 100 feet above the upstream extent of indicators.

Prescription applied:

- Fully implement applicable state riparian rules.
- Apply no-harvest within 25 feet of the ordinary high water mark.
 - Yarding corridors are prohibited in no harvest areas unless needed to minimize road construction. When needed, they must be approved as a site specific cooperative management response and kept to the minimum width while still allowing harvest.
- Apply the streamside roads mitigation provision (see Rp2).
- As conservation guidance (see glossary) retain those trees whose root systems are integrated into the stream bank.

Rationale:

Rp5 is an important conservation contribution because it focuses full tree retention on the high sensitivity reaches that are not addressed by the CMZ commitments. It also supplements state riparian protection by adding the protection of additional retention for these important reaches. Retention is focused on those segments that provide the greatest certainty of a conservation benefit and therefore provides the greatest conservation benefit.

As described in Plum Creek’s Technical Report #7 (Plum Creek 1999a), the high sensitivity reaches are those stream reaches where fish habitat function may be at greatest risk as a result of forest management. These are “plane-bed/forced-pool riffle” reaches (Montgomery and Buffington 1993) where LWD is the critical architectural element in the maintenance of channel and habitat complexity. Pool development and spawning sites are not as likely to occur without wood as they can in flatter gradients. Channels are also less likely to contain the boulders and large rocks that work along with woody debris to maintain channel complexity in steeper reaches. The loss of LWD over time would likely result in the loss of pools and the change in stream form from one with pools and riffles created by large woody debris to a more homogenous flume-like plane-bed channel. Focusing conservation efforts according to this classification provides a high likelihood that additional conservation will be applied where it has the greatest chance of reducing risk to important fish habitat elements.

Plum Creek's Technical Report #7 also gives a quantitative assessment of conservation benefit that is useful to managers in selecting a highly effective approach. The report demonstrates how trees left closest to the stream have the greatest chance of providing benefits for fish habitat, whether it is by ultimately dying and falling into the stream or by providing the forest canopy benefits of the standing trees.

A woody debris recruitment model was adapted for use in developing this NFHCP and is discussed in Technical Report #7. It takes actual Plum Creek riparian stand data and projects stand dynamics for the life of the project. Those dynamics include tree growth, tree mortality, and the likelihood a tree will add woody debris to the stream. The model also deducts the woody debris in the stream that deteriorates or gets flushed through the system. The result of the modeling effort was a prediction of the number of pieces of wood that would be loaded into 1,000-foot stream reaches of given riparian stand types after a 30-year period. In one of the Plum Creek riparian stands, this model showed that more than two-thirds of the total possible pieces of LWD that could be loaded to the channel over the next 30 years originate within 25 feet of the channel. Progressively lower amounts of LWD are contributed from trees growing at greater distances away from the stream. Plum Creek managers determined if additional timber should be offered for conservation, the significantly greatest opportunity for a return on that conservation investment is in the first 25 feet from the stream. Similar distance relationships apply to other benefits obtained from trees retained, such as shade and leaf litter fall.

Rp6: Other Perennial Fish-Bearing Streams

Applies where:

- Perennial stream segments that may support fish that have not been covered by previous prescriptions.
 - All streams without CMZs in Tier 1, except for high sensitivity reaches which are covered in Rp5, *High Sensitivity Streams without CMZs*.
 - All streams without CMZs in Tier 2.

Prescription applied:

- Fully implement applicable state riparian rules.
- Apply limited harvest provisions (see Rp2).

Conservation guidance (see the glossary in Chapter 8 of the DEIS):

- Retain those trees whose root systems are integrated into the stream bank.
- Favor trees that lean toward the streams for retention.
- Directionally fall trees away from the stream.

Rationale:

This prescription not only ensures the remaining streams that may support fish will have the full protection of the state SMZ rules, but it offers additional conservation guidance. While pool formation in these streams is not as sensitive to forestry activities as in other stream types, other riparian functions are. Examples are the immediate streamside trees whose live

roots contribute to stream bank integrity, as well as streamside canopy cover contributing litter fall to the stream.

D. Headwater Streams

“Headwater” streams may be either perennial or intermittent, and they may be either connected or unconnected by surface flow to a downstream stream segment. “Headwater” is the name that is used by the NFHCP for streams that are upstream from fish-bearing stream reaches and do not appear to regularly support fish. Nevertheless, headwater streams are important to fish because they can collect and store sediment and could influence downstream water temperature. Conservation measures applied to these streams can benefit the fish-bearing streams they flow into.

Rp7: Headwater Streams

A. Perennial, connected headwater streams.

The following applies to headwater streams that are not likely to have fish, or have few fish, but are both perennial and connected by surface flow to a stream that may support fish. Applies to:

- Class II perennial streams in Idaho.
- Perennial non fish-bearing streams in Washington, both east and west of the Cascades crest

Additionally, the following prescription will be extended to upslope to include intermittent streams that are connected by surface flow when they are associated with unstable features (see Appendix R-8).

(The state rule in Montana for these streams is the same as for fish-bearing streams, so this prescription is not necessary in Montana).

Prescription applied:

- A 50-foot Streamside Management Zone will be applied from the ordinary high water mark.
- Equipment will be excluded from this zone
- Limited harvest is allowed:
 - Retain at least 35 trees per acre (average 35-foot spacing) greater than 8 inches DBH.
 - Retain all sub-merchantable trees and brush (except when removal is warranted for safety or yarding corridors).
- Apply limited harvest provisions (see Rp2).
- **Thermal Management Zone:** When the stream contributes more than 20 percent of the flow to a stream that may support fish (as indexed by drainage area), the lowermost 500 feet of the headwater stream above the confluence will have additional retention within the 50-foot zone as a Thermal Management Zone.
 - Apply limited harvest rule, 88 tpa >8 inches dbh (see Rp2)
- Assure that the applicable state riparian rule is otherwise met.
- Apply conservation guidance from Rp6.

B. Intermittent (or seasonal), connected streams.

The following applies to headwater streams that do not likely support fish or flow year round but are connected by surface flow to ones that do, and occur east of the Cascades crest.

- When harvesting timber, retention of sub-merchantable conifers, hardwoods, and brush is required (except when creating yarding corridors or for safety).

Rationale:

The riparian management regulations in Washington and Idaho allow significant canopy removal in perennial connected headwater streams. Rp7 provides a significant conservation contribution by requiring canopy retention. The commitment is designed to preserve Cold water in these headwater streams so that they do not warm streams that support fish downstream. It also provides for woody debris recruitment that functions in these streams to provide for channel Complexity allowing for sediment storage and moderating the movement of sediment downstream.

Occasionally, openings in the harvest restriction zone are necessary to accommodate logging activities and minimize new road construction. For example, many existing roads, particularly in Washington, were designed with the intention of cable yarding logs across headwater streams unencumbered by standing trees. If regulations prohibit openings in streamside zones, additional roads would need to be constructed to adequately access Plum Creek's land base. To reduce such a potential increase in overall environmental impact, limited use of openings in the harvest restriction zone will be allowed where it is necessary for logging activities. These openings will be as small as is operationally possible. To compensate for the impact, more trees would be retained immediately upstream or downstream of openings. This is addressed in the lineal distribution provision of the limited harvest provisions (see Rp2).

The provision for retaining 35 trees per acre in the SMZ along perennial and connected headwater streams is based on the Stream Segment of Concern (SSOC) process in Idaho. As part of Idaho's anti-degradation water quality statute, Stream Segments of Concern were publicly nominated. Once nominated and selected, a Basin Area Group was formed of interested stakeholders in each segment of concern. These groups evaluated watershed conditions and vulnerabilities, examined existing Idaho FPA regulations, and recommended "Site Specific Best Management Practices" to prevent adverse impacts to water quality. In the Lochsa and Little North Fork Clearwater River basins, the Basin Area Groups recommended a leave tree spacing of 35 trees per acre along perennial non-fish-bearing streams as a Site Specific BMP. This NFHCP commitment would extend this level of protection to similar stream types in Idaho and Washington Project Area lands.

The Thermal Management Zone (TMZ) is intended to maintain headwater streams at temperatures close to natural conditions where they enter fish-bearing streams. It is applied when the headwater stream could have a significant effect on the temperature of a fish-bearing stream. Due to thermal mixing, this typically occurs when the headwater stream contributes more than 20 percent of the flow to a fish-bearing stream (See NFHCP Technical Report #12, Plum Creek 1998e). The length of the TMZ was set at 500 feet because research has found

that small streams can cool to equilibrium temperatures in this distance (Caldwell et al. 1991; Zwieniecki and Newton 1999). In addition, leave trees along smaller headwater streams (that is, contributing less than 20 percent flow to receiving waters) and along reaches outside TMZs will contribute to the cumulative thermal protection of streams throughout the headwaters. The leave tree density in the TMZ was set at Montana's requirement for Class I streams because this level of retention was found to maintain mean canopy cover over streams within 92 percent of the pre-harvest condition. Based on the temperature model developed in Plum Creek Technical Report #12 (1998e), this level of canopy removal should maintain temperatures close to background (Plum Creek 1998e). As discussed before, this will be verified in the Adaptive Management process.

As a result of public input and the desires of the Services subsequent to the Draft EIS and NFHCP, additional provisions were added to reduce further the risk of harvesting near intermittent or seasonal streams. Extending the protective requirements for perennial streams to seasonal streams where they occur within unstable features will reduce the risk that upland harvests will trigger landslides. Retaining submerchantable trees and shrubs on the remaining seasonal streams east of the Cascades crest that are connected by surface flow to perennial streams provides additional protection there as well. This can be done without significantly compromising the NFHCP business goals.

E. Riparian-Upland Interface

As previously stated, a **riparian area** is the land area immediately adjacent to a stream and extends away from the stream for a variable distance where soil and vegetative conditions are characteristic of and influenced by proximity to water. Changes in the riparian area from management activities can directly impact stream conditions and fish habitat. Protection for streams and fish habitat in the riparian area is generally achieved through streamside management regulations. The NFHCP provides additional protection to riparian areas by supplementing existing state riparian regulations, many times by leaving more trees within the state rule riparian area boundaries.

An **upland area** is the forest land area away from streams outside of the riparian area where soil and vegetative conditions are *not* influenced by localized streamside or wetland conditions, but are influenced by broad-scale environmental conditions such as aspect, elevation, soil type, and precipitation. Management actions in the upland can also create changes that affect fish habitat conditions, but in different and less direct ways. Impacts in the upland are minimized generally by implementing the BMP practices discussed for roads and for other upland management activities, and the NFHCP adds conservation by enhancing those BMPs in certain cases.

Describing these differences attempts to simplify what is much more complex and variable in nature. The boundary between a riparian area and the adjacent upland is not a distinct line that can be absolutely delineated or measured. It is an interface that may be a distinct transition or a very subtle or gradual one. This poses a challenge to managers who seek a balance between absolute or certain protection and forest management opportunity and who necessarily must draw lines on the landscape to achieve that balance.

The NFHCP recognizes the **riparian-upland interface** as an area where extra caution can be used to reduce the risk of impacts to fish habitat while preserving forest management opportunities. Rp2 through Rp7 add measurable conservation to state-established SMZ rules by increasing the rigor of restrictions within the SMZ in those stream reaches where the commitments will have the greatest measurable benefit for fish. Interface Caution Areas add cautionary protection from the impacts of upland management activities adjacent to, but outside of SMZs. This completes the approach to SMZ Rule supplementation as a package of conservation measures that add rigor to the SMZ rules **inside** of the SMZ while also implementing greater cautions **outside** of the SMZ.

Rp8: Interface Caution Areas (ICAs)

Applies where:

The following will be applied wherever timber harvest occurs adjacent to streams that are perennial and connected east of the Cascades crest.

- Montana: Class 1 streams.
- Idaho: Class I streams, and Class II streams that are perennial and connected.
- Eastern Washington: Fish-bearing and non-fish-bearing connected perennials.

ICA Location:

The ICA will be delineated within a harvest project from the streamside, will include the riparian area defined in Rp1 through Rp7 and will extend beyond the riparian zone to a point designated by the Plum Creek forester that meets the following criteria:

- The **width** of the ICA will be at least 150 feet horizontal distance from the ordinary high water mark, as an average by Planning Area Basin calculated annually.
 - Streams that are first order, greater than 10 percent in gradient, or not accompanied by a distinct valley feature will not be required for inclusion in the average width requirement and calculation. In cases where they are not included, the feathering feature (below) will be applied even if it goes beyond the hydrologic divide for that stream.
 - If the calculated average for a given year is below the minimum, subsequent years activities will be modified to ensure that the previous 5 year rolling average meets the minimum.
- The ICA (for determining average width) may not be extended beyond the hydrologic divide or the nearest road to the stream, unless that road has been abandoned per R7.
- The minimum ICA width will be 100 feet slope distance from the outside of the CMZ, unless it is limited by the hydrologic divide or nearest existing road.
- Areas within the ICA will be subject to the following requirements and additional conservation guidance.

ICA Requirements:

- **Constructed skid trails** will be prohibited.
 - Exception: if a constructed skid trail is required within the ICA, it will be fully reclaimed within the same operating season.
- **Mechanical site preparation** and slash treatment with tractors is prohibited.
 - This prohibition applies where ground slope is greater than 20 percent.
 - Piling or spot scarification may be performed by excavator only where slopes exceed 20 percent.

- **Broadcast burning** is prohibited.
- **Clearcutting** in the ICA will be avoided, provided that:
 - When the clearcut harvest method is applied in the ICA, it will be limited to no more than 5 percent of total ICA area annually, determined by Planning Area Basin.
- **Roads:** Roads will be prohibited within the ICA.
 - New roads will not be constructed within the ICA except where necessary to cross a stream.
 - ICAs will not extend beyond existing roads.
- **Field Measurement:** When ICA is at the minimum width, field measurement will be employed to ensure compliance.
- **Supplemental tree retention** (feathering) will be provided adjacent to the SMZ retention zone (provided for by state rules and Rp2 through Rp7) for 50 feet to provide a “buffer” to the SMZ at these levels:
 - 60 or more trees per acre larger than 20 feet tall, or
 - 30 or more trees per acre larger than 10-inch DBH, or
 - A prorated combination of the above.
 - Where the adjacent post-harvest stand exceeds these levels, the supplemental tree retention requirement will be considered met. Feathering outside of the SMZ is not required in those limited circumstances where ecological and silvicultural conditions warrant, such as stagnant lodgepole pine timber types or insect and disease infestations.
 - The outside bounds of the 50 feet may be an estimated distance and may form the outside bounds of the ICA for those streams not subject to the average width requirement and calculations.

ICA Additional Conservation Guidance: (see the glossary in Chapter 8 of the FEIS)

- **Skid trails will be designed** to further minimize soil and vegetation disturbance immediately adjacent to the SMZ:
 - Directional skidding away from SMZ will be used to the extent feasible, provided the directional trail does not increase the risk of routing sediment to the stream.
 - Skidding equipment should be confined to designated skid trails or corridors; avoid dispersed skidding unless ground is protected with a snow cover.
 - Spacing between skid trails or corridors should be maximized to maintain the integrity of the post-harvest stand.
- Seek to avoid concentrating projects with below-average widths in one fourth order watershed.
- **Road Abandonment:** Road abandonment adjacent or in proximity to streams will have high priority.
 - If a road is abandoned in conjunction with or prior to a harvest project, the ICA may be extended beyond the abandoned road. This provides a direct incentive to abandon roads that are adjacent to streams.

Rationale:

The Interface Caution Area commitment is designed to optimize conservation and management opportunity in the forest area outside of, but adjacent to, the Streamside Management Zone. It is intended to provide incentives to Plum Creek foresters to provide extra conservation in the form of wider ICAs, and increased road abandonment near streams where it is practicable in order to have greater management flexibility or intensive forest

management opportunity where it is needed for long-term forestry in other places. A “caution zone” approach was advocated by the U.S Fish and Wildlife Service in a conservation guidance document written for private landowners in bull trout habitat in December of 1998, based upon recommendations of the Montana Bull Trout Scientific Group (FWS 1998c). While these two documents advocate the use of “caution zones” in bull trout watersheds, the NFHCP extends the ICA commitment to all of the Project Area streams east of the Cascades to extend this benefit to the other covered species as well.

The implementation of ICAs will highlight the need for extra management caution for upland forestry that occurs closest to the streamside management areas. It will also reduce concerns about possible impacts to streams that are less direct and less measurable than impacts that could occur with immediate streamside activities. It serves as a communication tool to remind logging contractors in advance of harvesting where there is a need to apply extra caution, thereby functioning as an extra “safety net.”

Ground-disturbing activities that could increase the risk of sedimentation are moved farther away from the SMZs and the streams than required by state rules. The caution area approach serves as an enhanced BMP for minimizing new road construction. Rp8 states that where the ICA is less than 150 feet wide, it has to be proportionally wider elsewhere to achieve an average width of 150 feet. It also states that ICAs may not include roads. Whereas the relevant BMP non-specifically says to “minimize new road construction,” the ICA therefore provides an incentive-based approach to minimize road construction where it can have the greatest risk—close to the stream. And while Road Management prescription R7 commits to identify and abandon surplus roads, the ICA becomes the incentive for designating a road as surplus. Therefore, the incentive is to focus road abandonment where it also does the most good—close to the stream.

A partial retention canopy outside of the SMZ will help ensure SMZ integrity is protected from windthrow, and will moderate potential changes in microclimate or microclimate gradient that could influence stream conditions important to fish (Brososke et al. 1997).

Rp9: Riparian Harvest Deferrals

Plum Creek will defer streamside harvesting along fish-bearing streams until Year 10 of the Permit in the following watersheds:

- Rock Creek (tributary to Crooked Fork, Lochsa Basin, Idaho)
- Spruce Creek (tributary to Brush Fork, Lochsa Basin, Idaho)
- Placid Creek (tributary to Placid Creek, Blackfoot Basin, Montana)
- Twin Creek (tributary to Brushy Fork, Lochsa Basin, Idaho)
- Big Rock Creek (tributary to Thompson River, Middle Clark Fork Basin, Montana)

Streamside harvesting is a harvest that would be covered by state streamside management restrictions and/or NFHCP commitments described in Rp2 through Rp7.

Rationale:

Riparian harvests in these watersheds are being deferred as a programmatic safety valve to provide extra protection above and beyond NFHCP commitments. These watersheds were selected for extra protection because of concern regarding existing fish health, ownership patterns, or riparian management history.

Plum Creek conducted a risk assessment that identified these watersheds, where salmonid fish would be at the greatest risk of adverse effects as a result of streamside harvest. Lower risk watersheds were screened from consideration, leaving a final list where riparian harvest deferrals would ensure that riparian stand development and other NFHCP mitigation measures would realize a conservation benefit before implementing any additional harvesting in riparian areas.

For the first screen, Planning Area basins with the strongest native fish populations as well as Tier 2 lands were removed from consideration on the basis of fish population status. Then, watersheds with a vast majority of federal ownership were excluded because rigorous federal strategies for protecting fish combines with a stronger legal obligation on those lands to reduce watershed-scale risk resulting from Plum Creek activities. Lastly, watersheds containing a low percentage of Plum Creek ownership were eliminated because Plum Creek actions are a smaller factor in the overall habitat status.

The final list of watersheds chosen for the Rp9 riparian harvest deferral includes those for which inventory data suggest a more lengthy or extensive riparian management history. The riparian harvest deferral provides an opportunity for these watersheds to develop their streamside stands. More mature riparian forests will better provide proper riparian function to benefit native fish. Other NFHCP conservation commitments will be applied to riparian areas in these watersheds before harvesting may occur after the deferral period ends in Year 10 of the Permit.